DIY Remote Radio Now

Get connected to remote radios with this tutorial.

Pamela Stanley-Millner, KA2MGR, listens to her favorite stations poolside with an Android radio remote smartphone device. [James Millner, WB2REM, photo]

Jim Millner, WB2REM, and Gene Hinkle, K5PA

In this article, we describe how remote radios work, the types of systems currently available, and a simple way to get on the air using just a personal computer (PC), Android phone, or tablet. We explain how to configure a remote radio client on your device, and how to interface to remote stations around the world.

Remote Radios Can Get Connected

Figure 1 shows the basic components of our remote radio system. The radio and computer are set up as a remote server, so it can be operated over a remote connection. However, a local user can still operate the radio normally from the station location. For remote use, there must be connections between the radio's microphone, speaker, and control circuitry to allow these signals to be connected to an interface that will then connect to the internet.

Remote Options

There are three types of remote radio systems. The first type encompasses the purely hardware solutions. A local computer is not needed because it is designed into the interface box. The second type is a remote station that uses a computer with associated software alongside the radio to provide the interface to the internet. The third type includes the homebrew solutions utilizing audio connections between the radio and computer. *TeamViewer*, *Skype*, and *Ham Radio Deluxe* support this third type of operation.[1, 2, 3] At the end-user side of the remote link, an interface that runs a small piece of *client* software is needed. The client software resides on a notebook computer, tablet, or cell phone.

A mobile radio operator can use an Android device as the hardware interface and a client software application to control the remote radio accessories, such as antenna rotators, amplifiers, antenna switches, and CW and voice keyers.

For the do-it-yourself Amateur Radio operator, the *RemoteHams* client can be set up easily and at low cost. For truly mobile users, the *RCForb RemoteHams* software for the Android operating system is available from the Google Play store. *Windows* PC users can download *RCForb Client* from the

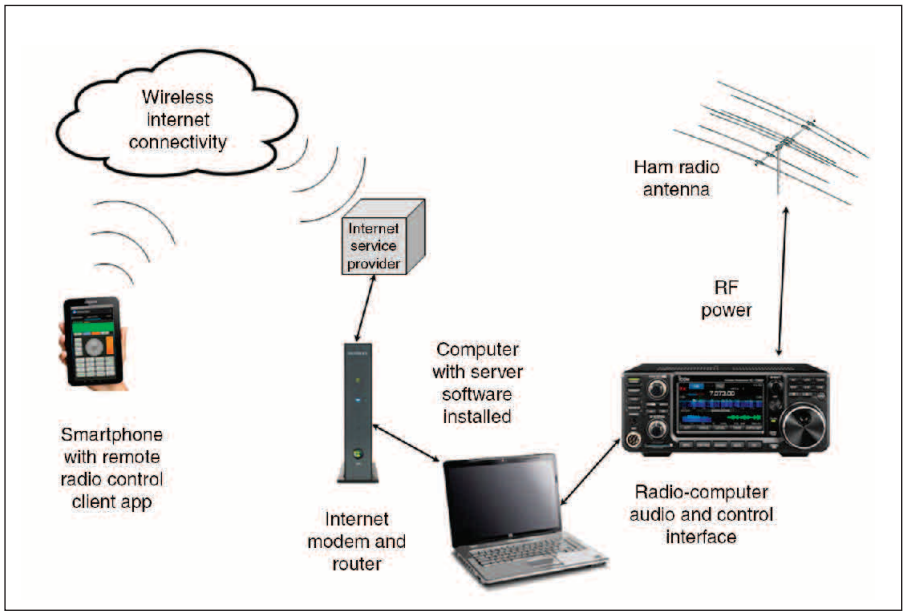
Wireless internet connectivity
Internet service provider
Ham radio antenna
RF power
Computer with server software installed
Smartphone with remote radio control client app
Internet modem and router
Radio-computer audio and control interface

Figure 1 — Building blocks for a remote radio station from client to server and radio.

Figure 2 — The main headings of the *Windows RCForb Client*.

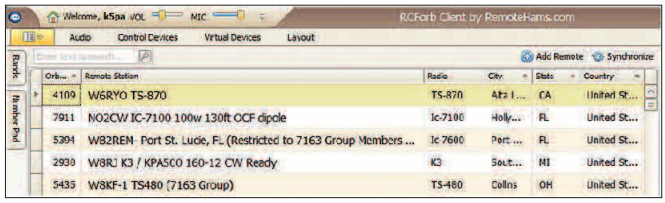
RCForb Client by RemoteHams.com
Audio
Control Devices
Virtual Devices
Layout
Add Remote
Synchronize
Orb...
Remote Station
Radio
City
State
Country
4109 W6RYO TS-870 TS-870 Alta I... CA United St...
7911 NO2CW IC-7100 100w 130ft OCF dipole Ic-7100 Holly... FL United St...
5394 W82REM- Port St. Lucie, FL (Restricted to 7163 Group Members ... Ic 7600 Port ... FL United St...
2930 W8RJ K3 / KPA500 160-12 CW Ready K3 Sout... MI United St...
5435 W8KF-1 TS480 (7163 Group) TS-480 Collins OH United St...

Figure 4 — Click on the entry name to connect to the remote radio.

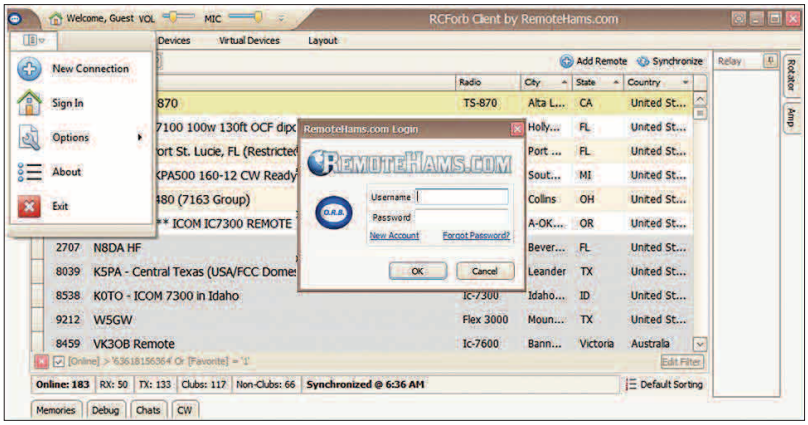

Figure 3 — The *RCForb Client* sign-in sequence.

"Downloads" tab of the *RemoteHams* web page. The *RemoteHams* radio links, with the permission of the remote station owner and proof of licensing, can allow for free access to other stations worldwide.

Connecting to Remote Radios

Download the *Windows* version of *RCForb* by following the three-step process on the *RemoteHams* web page.[4] Download the Android version (for a nominal fee of about $10) by searching for the *RCForb* app in the Google Play store.

Establish a username (your call sign) and password at the *RemoteHams* web page. A copy of an Amateur Radio license must be uploaded to the "License Verification" area of the "My Account" tab on the *RemoteHams* server.

When the *Windows RCForb Client* is brought up for the first time, five main tab headings will show. Click on the leftmost tab, as seen in Figure 2, and enter your username and password in the login window. In subsequent logins, the "Sign In" dropdown menu item is changed to "My Account" and, when clicked, a new dropdown menu appears with "My License," "My Profile," and "My Clubs." Note the four prominent headings (see Figure 3) of "Audio," "Control Devices," "Virtual Devices," and "Layout." Click the "Audio" heading to show the current selection for the audio input and output devices. Look at the default selections and change to other device options if necessary.

Once you've made all the *Windows RCForb Client* selections and you are logged in, the client will download the current remote bases available. The remote station is selected by clicking on the appropriate line, shown in Figure 4.

In the Android *RCForb* version, click on the three vertical dots on the top right side of the page, go to "Settings," and change the default "Station call sign" to your call sign, add the "Station locator" grid square, choose a "DX Cluster Client," and enter your username and password. Leave the "Enable Swipe" tabs and "Auto PTT on Test" checked (enabled).

When the Android *RCForb Client* starts, four prominent section headers ("Remote Stations," "Radio Control," "Chat," and "DX Cluster") appear at the top. All of the areas can be viewed by swiping the screen to the left. The "Remote Stations" section is called the *lobby* and lists all available stations (see Figure 5). Select and click the remote station to connect.

A Virtual Remote Radio

The exact presentation of the linked remote radio depends on the settings of each server. The *Windows RCForb Client* is shown in Figure 6. The "Delay" message indicates the internet latency. Large latency makes communication difficult and choppy. The "Chats" area near the bottom lists current users. Press the ASK button on the bottom right to request permission to tune.

To disconnect from the remote radio, click on the leftmost tab and then select "Disconnect."

A typical Android *RCForb Client* virtual remote radio screen is seen in Figure 7. Click on the three vertical dots on the right-hand side of the screen to bring up the "Settings" selection panel. Disconnect by going up one level and choose "Disconnect," or close the application on the device.

Don't be afraid to look at the various menu options and adapt the client to your situation. You can join the Online

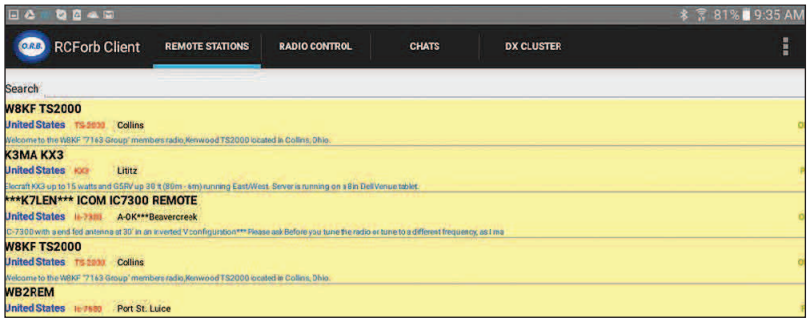

Figure 5 — The "Remote Stations" tab lists stations in the lobby.

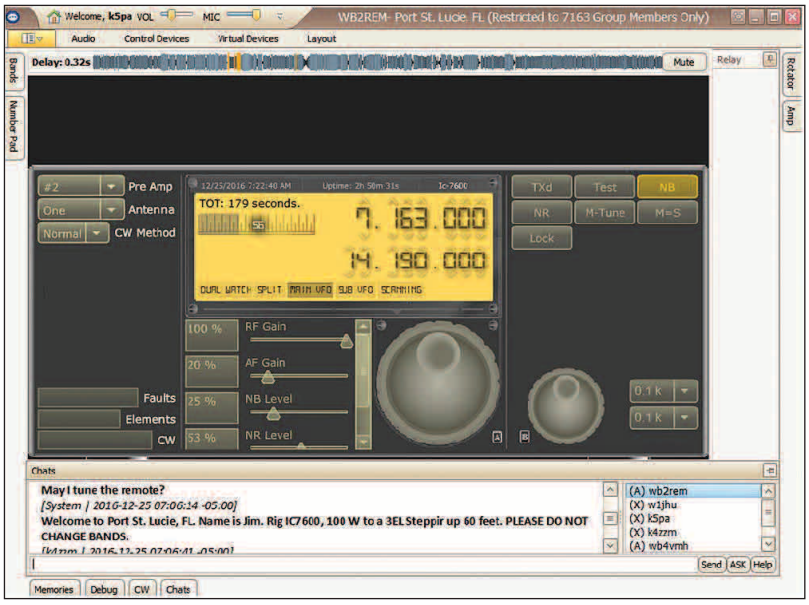

Figure 6 — The *Windows RCForb Client* screen.

Remote Base (ORB) Community in the "Support Forums" tab on the *RemoteHam*s web page.

RemoteHams Server

You must install the *RemoteHams Server* if you wish to remotely operate your home station. Download the free software from the "Downloads" tab of the *RemoteHams* web page. Choose a radio to run on the link. Radios such as the Icom IC-7600, where the audio channels and CI-V/CAT control require only a USB cable between the radio and the server computer, are perfect.

The initial setup of the server requires the same *RemoteHams* username and password previously created for the client. In the "Global Server Configuration Wizard" (see Figure 8), select the "Options" tab, then select "Audio Configuration" to set up the microphone and speaker volume for the link.

Next, go to the "Radio Connection" tab and select the COM port attached to the USB cable. In addition, indicate the radio manufacturer and model. Add the radio serial rate and CI-V address if using an Icom radio. In most cases, the push-to-talk (PTT) will be through the CAT connection, and CW keying through a COM port. To enable CW, a USB to ¼-inch plug cable is required from the key jack out of the radio to a USB port on the host computer. The COM port it uses must be identified. Other devices, such as amplifiers, switches, and rotator control, can be set up in this area.

In the "Server Configuration" area, choose the "Server Settings" security options you desire.

Next, go to the "Publishing" tab and check "Visible on *RemoteHams*" if you want others to see your link. Name the remote (your call sign, your location, and other information about your setup). This information will be searchable in the lobby of the client. Check off whether transmitting is allowed and if Club Mode will be an option (Club Mode lets designated members of a club access the server). Fill in the demographic information and "Welcome" and "Popup" messages.

Under the "Options" tab, Club and TX Managers are an easy way to approve stations that have requested permission to use the link. In "User Manager," stations can be added or deleted manually. In "Security Manager," specific frequency ranges of operation can be set. Under "Allowed RX and TX frequency range," set the desired operating limits. The three horizontal dots next to the ENABLED button allow entry of upper and lower frequencies. Different settings can be saved through

DXCC and Remote Operating

In January 2015, the ARRL Board of Directors addressed specific rule changes concerning remote operation and obtaining DXCC credit for countries worked (see **www.arrl.org/news/arrl-board-okays-changes-to-dxcc-program-vhf-and-above-contesting-rules** for more details). The rules state that an operator can be physically located anywhere in the world — land, sea, or air — and work through a remote station. Transmitter location continues to define a station's location, and, for DXCC purposes, all transmitters and receivers must be located within a 500-meter diameter circle, excluding antennas.

Figure 7 — Typical Android *RCForb Client* virtual remote radio screen.

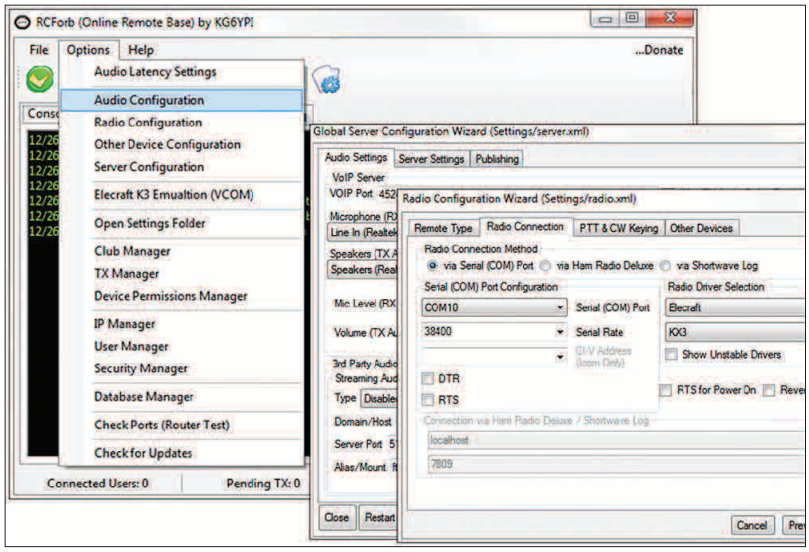

Figure 8 — *RemoteHams Server* windows' audio and radio configuration settings.

the exporting and importing feature.

Lastly, the link must be able to communicate over the internet, so a few router TCP ports need to be forwarded. The TCP ports include 4524, 4525, and 843. The server attempts to automatically open the ports when first starting up the *RemoteHams* server. In the "Options" area, near the bottom, the "Check Ports (Router Test)" can be chosen to see if they were, in fact, opened. If this fails, you may need to forward the ports manually. Consult the documentation for your specific router.[5] Next, check the "Check Ports" tab to see if the ports opened.

There are many other functions available for the *RemoteHams* server (see the "Help" section of the server to learn more). When all is working well, the server screen will recognize the radio and audio devices, and indicate that the specific radio is ready for use.

All operators need to be considerate with respect to the operation of the remote radio. This means learning and following the instructions provided by the owner for the user to follow. Be courteous! Let others know where you are located as the remote operator and occasionally announce what remote radio station you are using.

Summary

The movement from UHF-controlled links to internet-based radio has opened a whole new world of accessibility to Amateur Radio operators. In essence, your radio is no further away than your cell phone. Enjoy Amateur Radio to the fullest. Try the 21st-century way of operating — DIY remote-controlled radio.

We thank Brandon Hansen, KG6YPI, the *RemoteHams* software designer, and Roger Macdonald, W8RJ, for their assistance in writing this article. We also thank the 7163 NET Group (**www.7163net.com**) for the early-morning assistance in testing and evaluating remote link performance between the US and Australia.

Notes
[1]**www.teamviewer.com**
[2]**www.skype.com**
[3]**www.hrdsoftwarellc.com**
[4]**www.remotehams.com**
[5]**https://portforward.com**

James Millner, WB2REM, has been a ham radio operator for over 50 years. He is an avid DXer, world traveler, and is a licensed psychologist. He began experimenting with remote control linking in the 1980s and published the first article on the subject, "The Missing Link," in the September 1986 issue of *73 Magazine*. His remote link was featured in a portion of the 1988 ARRL video, "The New World of Amateur Radio." In June 1995, *QST* published his article, "The WB2 'REMote' Link," which presented a hardware solution to remote linking. He has written other related articles for *QST*, as well as articles pertaining to his profession and the current state of Amateur Radio for *CQ Magazine*. You can reach Jim at **wb2rem@amsat.org**.

Gene Hinkle, K5PA, began experimenting with ham radio at a very young age, which led him to a career in RF engineering. He earned his MSEE from The University of Texas at Austin. He is an IEEE Life Senior Member and a retired professional engineer in Texas. He is also an ARRL Life Member and a Volunteer Examiner. Gene recently retired from a radio technology company specializing in radio-geolocation. His favorite operating modes are CW, low bandwidth digital signals, and working DX. His web page, **www.k5pa.com**, shows his interests, photographs, and publications. You can reach Gene at **k5pa@arrl.net**.

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